The Solar and Heliospheric MOWG **2009 February**

I. Findings on Solar and Heliospheric SR&T

1. Solar and Heliospheric SR&T resource allocation

The Solar and Heliospheric (S&H) MOWG supports continuing the increase in funding for Low-Cost Access to Space (LCAS) proposals to allow two new proposals, rather than one, to be funded per year. We note that LCAS proposals have no alternative source of funding within Heliophysics, and we consider low-cost access to space essential for the long-term health of NASA's Heliophysics enterprise. While the MOWG shares the concerns of the Heliophysics Subcommittee that this increase comes at the expense of SR&T funding available for other types of proposals, including new theory, modeling, and data analysis efforts, many proposals in these latter categories can also be submitted to the LWS TR&T and Solar and Heliospheric Guest Investigator programs. Since statistics from the first year of increased LCAS funding indicate relatively little impact on theory, modeling, and data analysis acceptance rates, we support continuing this increased LCAS funding experiment for at least one more year. After the next round of S&H SR&T selections, we will examine its effects on theory, modeling, and data analysis proposals over two selection cycles, and determine whether to recommend continuing the redistribution of SR&T resources.

2. Instrument development resources

To enable substantive scientific advances relevant to NASA's goals, a viable program for the development of new instruments is vital . The S&H MOWG applauds the fact that 10% of the SR&T proposals selected in FY07 and FY08 involved the development of new Solar and Heliospheric instrumentation. This is a step in the right direction and will help the community explore innovative measurement concepts and develop state-of-the-art technologies and subsystems for the next generation of spaceflight instrumentation. The MOWG, however, finds that current funding levels for this program are not sufficient for researchers to develop these novel concepts to a technological readiness level of 4 (TRL 4) – a critical step that requires validating new design concepts with tests and measurements using laboratory prototypes. The S&H MOWG also recognizes that if these additional funds were to be found solely within the SR&T program, this will adversely affect the theory, modeling, and data analysis components. Consequently, the MOWG encourages the Heliophysics Division to seek new ways to increase funding for this endeavor that is essential not only for achieving NASA's strategic goals but also for our nation's competitive edge and global leadership.

3. Removal of exclusions on the Instrument Development Program

The Solar and Heliospheric SR&T instrument development program (IDP) and LCAS elements have for several years excluded support for projects that "directly affect life and society." This exclusion was instituted to prevent overlap with an LWS TR&T element that no longer exists. The S&H MOWG therefore strongly urges the

Heliophysics Division to remove this exclusion from future ROSES solicitations for LCAS and instrument development.

4. Protection of SR&T theory, modeling, and analysis resources

The S&H MOWG recognizes that successful enlargement of opportunities for instrument development and low-cost access to space may come at the cost of reduced support of theory, modeling, and data analysis without compensating support from LWS TR&T and the SH Guest Investigator Program. We recommend that Heliophysics staff continue to monitor the success rate for proposals in these areas, so that they can ensure that adequate support for instrument efforts does not result in weakening support for theory, modeling, and data analysis.

II. Finding on Modeling Efforts of Increased Scope

The heliophysics community is increasingly faced with modeling nonlinear processes in a complex web of intricately linked physical phenomena. Those phenomena range from dynamo processes within the Sun to the plasma physics of the solar corona and heliosphere, and from planetary bow shocks through their magnetospheres reaching into their atmospheres. Such nonlinear processes cannot be adequately interpreted or modeled by analyzing their component processes in isolation, while simplified approximations often change the behavior of the systems altogether. With the growth of computational capability, numerical and theoretical work has significantly advanced our understanding of many of these processes that connect the Sun to its planets, and NASA is to be commended for its support of this critical research. However, the limited scope of grants available for modeling efforts severely hampers substantive advances, and computer technology has outpaced software advancement.

The S&H MOWG urges the Heliophysics Division to study the potential benefits to its heliophysics research goals of implementing a new category of focused, in-depth , high-resolution numerical experiments at the frontier of what is enabled by hardware developments, in support of its observational missions. Such explorations could include, for example, global models of solar magnetoconvection to better understand the dynamo; hybrid kinetic-MHD models to study solar eruptive events, heliospheric particle acceleration and transport, or magnetospheric storm developments including the solar-wind and ionospheric boundaries; or the particle, chemical, and energetic couplings from the top of the Earth's atmosphere into the tropospheric climate. Such explorations might be implemented as competed multi-year grants that support an adequate number of researchers and programmers to design, develop, and deliver advanced community modeling software, which they subsequently support for the project's own research goals as well as for guest experimenters. The modeling projects could be assessed in a Senior Review to determine their merits for continuing support. Starting such explorations at even a relatively low frequency would create research tools that can guide the interpretation of observations towards new discoveries as well as the development and design of new missions.

III. **Thanks to Drs. Christian and Pevtsov**

The members of the S&H MOWG would like to express their thanks to Drs. Eric Christian and Alexei Pevtsov who interrupted their productive careers as research scientists to devote several years to the cause of furthering the science of the entire Heliophysics community. We are deeply aware of the profound nature of such a sacrifice, and are sincerely thankful for the significant contributions made by these two dedicated members of our community.